

CARDIOEMBOLIC STROKE - A STUDY OF ITS INCIDENCE, AETIOLOGY, CLINICAL PRESENTATION AND OUTCOME

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ABSTRACT

BACKGROUND

Cardioembolic stroke accounts for 14-30% of all cerebral infarctions with a greater tendency of recurrence and it can be prevented. Cardioembolic stroke is a potentially devastating condition that causes frequent diagnostic and therapeutic difficulties and prompt diagnosis to define cardioembolic strokes is important for its secondary prevention.

The objective of the study was to study the incidence, aetiology, clinical presentation and outcome of a cardioembolic stroke.

MATERIALS AND METHODS

The present observational study was conducted among a sample size of 100 cases of admitted to Intensive Care Unit in Al Ameen Medical College Hospital with an onset of acute neurological deficit in the age group of 30-85 years having first event of acute ischemic stroke after taking a written, informed consent. The study period was November 2015 to August 2017.

RESULTS

The mean age of our study population was 55.95 ± 12.71 years with male dominance (62%). The incidence of cardioembolic stroke was 19% and mean age group among the cardioembolic stroke was 59.21 ± 12.10 years. Non-valvular atrial fibrillation was found in majority of patients. The patients mostly presented with motor impairment followed by altered consciousness. Infarct involved the middle cerebral artery territory in majority of patients. The survival rate was 89.47%.

CONCLUSION

Cardiac sources of embolism have to be carefully sought and echocardiography is the main diagnostic tool. The most frequent cardiac source of embolism is atrial fibrillation.

KEYWORDS

Cardioembolic Stroke; Incidence; Aetiology; Atrial Fibrillation.

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BACKGROUND

Stroke is defined as an abrupt onset of neurologic deficit due to vascular cause. It is a major cause of disability and the second most cause of mortality worldwide, after ischemic heart disease.¹

Cardioembolic stroke is the stroke caused by heart diseases primarily due to embolism of thrombotic material forming on the atrial and ventricular wall or the left heart valves.¹ This accounts for 14-30% of all cerebral infarctions² with higher chances of recurrence which can be prevented. Cardioembolic stroke is a potentially devastating condition

that causes frequent diagnostic and therapeutic difficulties. Emboli from the heart most often lodge in the intra cranial internal carotid artery, the MCA, the PCA, or one of their branches; infrequently the ACA is involved.¹ The most common causes include atrial fibrillation, mural thrombus, myocardial infarction, ischemic heart disease, dilated cardiomyopathy, valvular lesions and infective endocarditis.

The clinical features that support the diagnosis of cardioembolic stroke includes sudden onset to maximal neurological deficit (<5 min), which is present in 47-74% of cases and decreased level of consciousness at onset in 19-31% of cases.⁴ A classic cardioembolic presentation include onset of symptoms after a Valsalva provoking activity (coughing, bending etc.) suggesting paradoxical embolism facilitated by a transient rise in right atrial pressure and the co-occurrence of cerebral and systemic emboli.⁵

In 4.7-12% of cases, cardioembolic infarctions show a rapid regression of symptoms (the spectacular shrinking deficit syndrome) which is important for a clinical suspicion of the cardioembolic origin of the cerebral infarction.^{6,7} This

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dramatic improvement of an initially severe neurological deficit may be due to distal migration of the embolus followed by recanalization of the occluded vessel.^{8,9}

Wernicke's aphasia or global aphasia without hemiparesis are other common secondary symptoms of cardioembolism.^{8,9} In the posterior circulation, cardio embolism can produce Wallenberg's syndrome, cerebellar infarcts, top-of-the-basilar syndrome, multilevel infarcts, or posterior cerebral-artery infarcts. Visual-field abnormalities, neglect and aphasia are also more common in cardioembolic than in non-cardioembolic stroke.¹⁰

Other clinical symptoms classically associated with cardioembolic infarction, such as headache, seizures at onset and onset during activity are not specific for cardioembolic stroke.⁸ In addition, some signs or syndromes, such as lacunar clinical presentations (e.g., pure motor hemiparesis or ataxic hemiparesis), a lacunar infarct and particularly multiple lacunar infarcts make cardioembolic origin unlikely.¹¹ Cardiac embolism is a very rare cause of lacunar infarction (2.6-5% of cases).¹² Haemorrhagic transformation of an ischemic infarct and early recanalization of an occluded intracranial vessel are suggestive of a cardiac origin of the stroke. Haemorrhagic transformation occurs in up to 71% of cardioembolic strokes.²

Neuroimaging data that support cardioembolic stroke include simultaneous or sequential strokes in different arterial territories. Due to their large size, cardiac emboli flow to the intracranial vessels in most cases and cause massive, superficial, single large striato-capsular or multiple infarcts in the middle cerebral artery. Therefore, cardioembolic infarctions predominate in the carotid and middle cerebral artery distribution territories.⁵ On the computed tomography (CT) scan, bi-hemispheric combined anterior and posterior circulation, or bilateral or multilevel posterior infarcts are suggestive of cardioembolism. MRI studies can increase the suspicion of cardio-embolism by demonstrating lesions not apparent on CT scans. Thus, haemorrhagic infarct or multiple arterial infarcts (not lacunar) on computed tomography

(CT) scans or magnetic resonance images (MRIs) and/or an embolus in transit on angiography are radiologic findings that when associated with clinical features, are suggestive of cardioembolic stroke.¹³

Thus, the present study was selected to know the incidence, different aetiologies, varying clinical presentations and outcome of the subjects following to a cardio embolic Stroke.

MATERIALS AND METHODS

The present study was observational study carried out at Tertiary Institute to study the incidence, aetiology, clinical presentation and outcome of a cardio embolic stroke. This study was conducted during the period from November 2015 to August 2017. The study was conducted at Department of Medicine, Al Ameen Medical College and Hospital. All patients with diagnosis of ischemic stroke admitted to Intensive Care Unit in Al-Ameen Medical College and Hospital during the study period were included in the study.

A total of 100 patients selected by simple random sampling with acute neurological deficit were included in the study. The study was conducted after obtaining clearance from the Ethical Committee of the institute and permission from the appropriate authority.

RESULTS

Age Ischemic Stroke Mean± SD 55.95±12.71 Range (33-84)

Age Group	No. of Patients	Percentage
30-40	12	12.00
41-50	20	20.00
51-60	26	26.00
61-85	42	42.00
Total	100	100

Table 1. Distribution of Ischemic Stroke Patients of Ischemic Stroke According to Age

Sex	No. of Patients	Percentage
Male	62	62.00
Female	38	38.00
Total	100	100

Table 2. Distribution of Ischemic Stroke Patients According to Sex

The above table shows distribution of ischemic stroke patients according to age. It was observed that majority of patients were in the age group 61-85 years (42%) followed by 51-60 years (26%). The incidence among 41-50 years was 20% and 20-40 was 12%. Calculated mean age is 55.95±12.71 years.

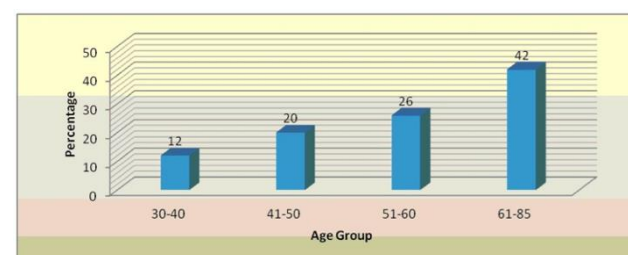


Figure 1. Age Distribution of Ischemic Stroke

The above table shows distribution of patients according to sex. It was observed that majority of patients were male (62%) and females were 38%. The above table shows incidence of sub-types in patients with ischemic stroke. It was observed that incidence of cardioembolic stroke among patients was 19%. The incidence of atherothrombotic stroke was 39%, lacunar stroke was 24% and unknown cause was 19%.

Age Cardioembolic Stroke Mean±SD 59.21±12.10 Range (36-78)

The above table shows incidence of cardioembolic stroke by age. It was observed that incidence of cardioembolic stroke among patients was major in age group 61-85 years (47.37%) followed by age group.

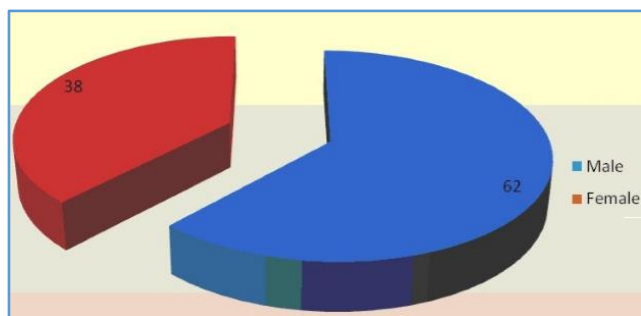


Figure 2. Sex Distribution of Ischemic Stroke

Stroke Sub-type	No. of Patients	Percentage
Atherothrombotic	39	39.00
Cardioembolic	19	19.00
Lacunar	24	24.00
Unknown cause	19	19.00
Total	100	100

Table 3. Distribution of Patients with Ischemic Stroke According to Incidence of Stroke Sub-Types

51-60 years (31.58%). The incidence in age group 30-40 and 41-50 years were 10.52% each. The calculated mean age in cardioembolic stroke was 59.21 ± 12.10 years.

The above table shows incidence of cardioembolic stroke by sex. It was observed that incidence of cardioembolic stroke among male patients was 63.16% and female was 36.84%.

(* Multiple response Present)

The above table shows distribution of cardioembolic stroke patients according to previous illness/risk factors. It was observed that majority of patients were hypertensive (52.63%) followed by Diabetes Mellitus.

Age	No. of Patients	Percentage
30-40	02	10.52
41-50	02	10.53
51-60	06	31.58
61-85	09	47.37
Total	19	100

Table 4. Distribution of Cardioembolic Stroke Patients According to Incidence by Age

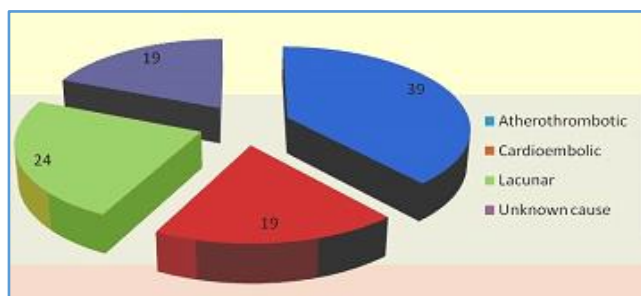


Figure 3. Incidence of Sub-Types in Patients with Ischemic Stroke

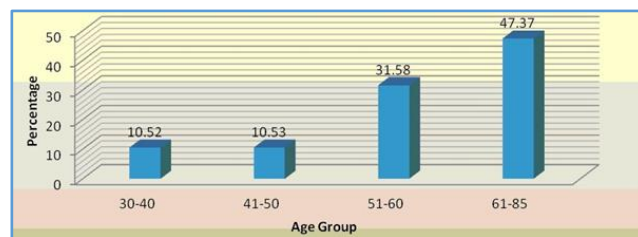


Figure 4. Age Wise Incidence of Cardioembolic Stroke

Sex	No. of Patients	Percentage
Male	12	63.16
Female	07	36.84
Total	19	100

Table 5. Distribution According to Incidence of Cardioembolic Stroke by Sex

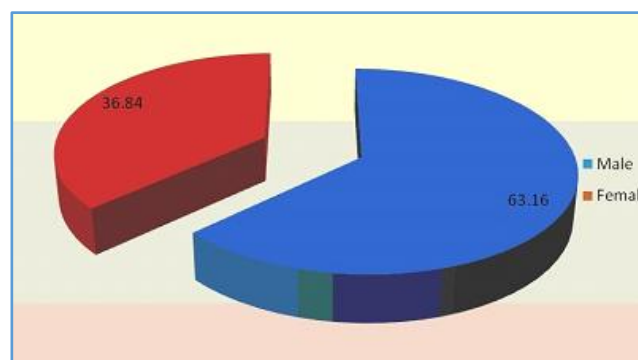


Figure 5. Sex wise Incidence of Cardioembolic Stroke

Previous Illness/Risk Factors	No. of Patients (n= 19)	Percentage
Hypertension	10	52.63
Diabetes Mellitus	05	26.32
Previous H/O MI	03	15.79
Smokers	09	47.37
Alcoholics	02	10.53
Dyslipidaemia	04	21.05

Table 6. Distribution of Patients of Cardioembolic Stroke According to Previous Illness/Risk Factors

(26.32%), 3 patients had previous MI history. The risk factors: smoking was present in 9 (47.37%) patients and dyslipidaemia in 4 (21.05%) patients, 2 patients (10.53%) were alcoholic.

The above table shows distribution of patients of cardioembolic stroke according to observations at presentation. It was observed that mean fasting blood sugar among patients was 110.3 ± 28.62 mg/dl. The mean systolic blood pressure among patients was 158.1 ± 15.19 mm of Hg, the mean diastolic blood pressure was 86.52 ± 7.24 mm of Hg. The mean GCS at presentation was 12.11 ± 1.60 . (*Multiple aetiologies present)

Observation	Mean	±2SD
Systolic BP	158.1	±15.19
Diastolic BP	86.52	±7.24
Fasting Blood sugar	110.3	±28.62
GCS	12.11	±1.60

Table 7. Distribution of Patients of Cardioembolic Stroke According to Observations at Presentation

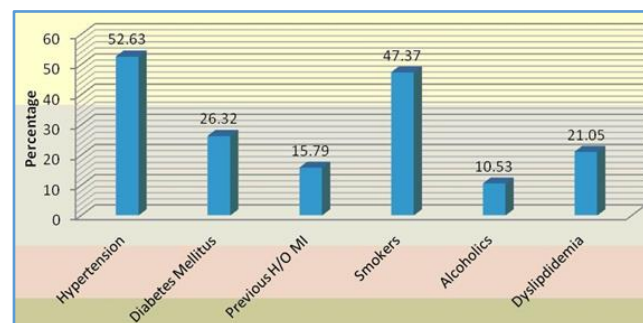


Figure 6. Previous Illness/Risk Factors in Patients with Cardioembolic Stroke

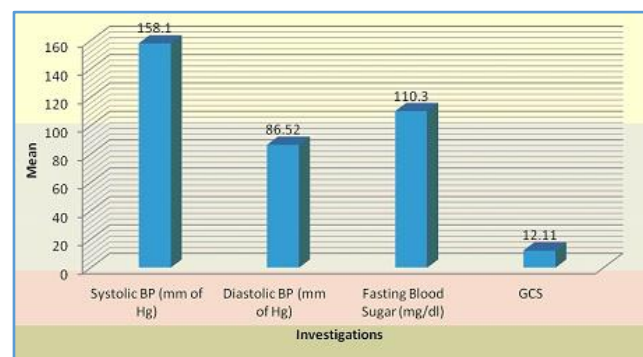


Figure 7. Observations at Presentation in Cardioembolic Stroke Patients

Aetiology	No. of Patients (n=19)	Percentage
Congenital abnormalities/Paradoxical embolism	03	15.78
Valvular heart disease	04	21.05
Coronary Artery Diseases	04	21.05
Dilated Cardiomyopathy	02	10.53
Atrial fibrillation	09	47.37
Nonbacterial endocarditis	01	05.25

Table 8. Distribution of Patients of Cardioembolic Stroke According to Aetiology

Clinical Presentation	No. of Patients (n=19)	Percentage
Headache	07	38.84
Nausea, Vomiting	06	31.57
Altered consciousness	09	47.37
Motor impairment	13	68.42
Speech disturbance	08	42.11
Others	07	38.84

Table 9. Distribution of Patients of Cardioembolic Stroke According to Clinical Presentation

The above table shows aetiology of cardioembolic stroke in the study. It was observed that most common cause of cardioembolic stroke among patients was atrial fibrillation (47.37%). The other aetiologies were Valvular heart disease (21.05%), Coronary Artery Disease (21.05%), Congenital Abnormalities (15.78%), Dilated Cardiomyopathy (10.53%), Nonbacterial Endocarditis (5.25%).

(* Multiple response Present)

The above table shows clinical presentation of cardioembolic stroke patients. It was observed that majority of patients presented with motor impairment (68.42%) followed by altered consciousness (47.37%).

The other clinical presentation includes speech disturbance (42.11%), headache (38.84%), nausea/vomiting (31.57%) and others in 38.84% patients. The above table shows distribution of cardioembolic patients according to ECG at presentation. It was observed that majority of patients were having abnormal ECG findings (84.21%).

The above table shows distribution of cardioembolic patients according to 2D ECHO at presentation. It was observed that all of patients were having abnormal 2D ECHO findings. The majority of patients had Non-Valvular Atrial Fibrillation (31.58%) followed by Valvular Abnormality with Atrial Fibrillation (15.79%) and Regional Wall Motion Abnormalities (21.05%), 2 patients (10.53%) had Dilated Cardiomyopathy and another 2 patients (10.53%) had isolated Valvular abnormality, 3 patients of paradoxical embolism of which 2 had PFO (10.53%) and one had ASD (5.26%).

The above table shows distribution of cardioembolic patients according to infarct size on CT/MRI. It was observed that majority of patients had large size infarct (57.90%) followed by medium size (36.85%) and small infarct size among 5.26% patients.

ECG	No. of Patients	Percentage
Normal	03	15.79
Abnormal	16	84.21
Total	19	100

Table 10. Distribution of Patients of Cardioembolic Stroke According to ECG at Presentation

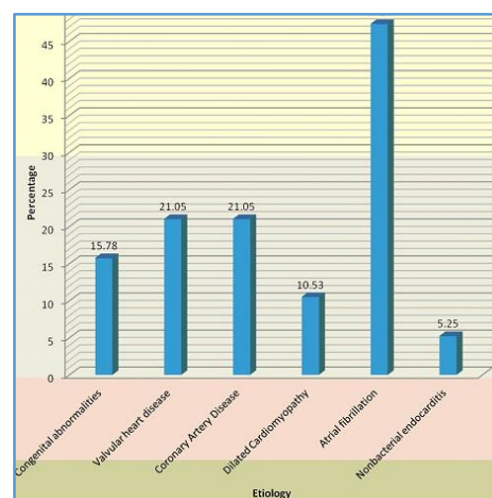


Figure 8. Distribution of Patients of Cardioembolic Stroke According to Aetiology

The above table shows distribution of cardioembolic patients according to topography of infarction. It was observed that majority of patients involved in MCA territory (52.63%) followed by PCA (15.79%). 3 patients (15.79%) had multiple territory infarct. 1 patient (5.26%) each had infarct in ACA territory and in watershed area. 1 patient had haemorrhagic transformation.

The above table shows distribution of cardioembolic patients according to outcome. It was observed that majority of patients survived (89.47%) while 02 (10.53%) patients died during hospital stay.

DISCUSSION

Cardioembolic stroke is a potentially devastating condition that causes frequent diagnostic and therapeutic difficulties and prompt diagnosis to define Cardioembolic Stroke is important for secondary prevention.

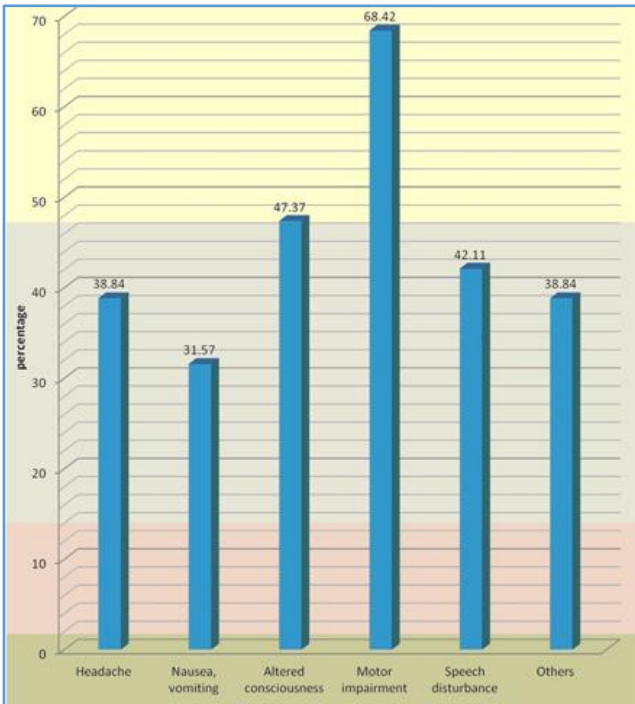


Figure 9. Distribution of Patients of Cardioembolic Stroke According to Clinical Presentation

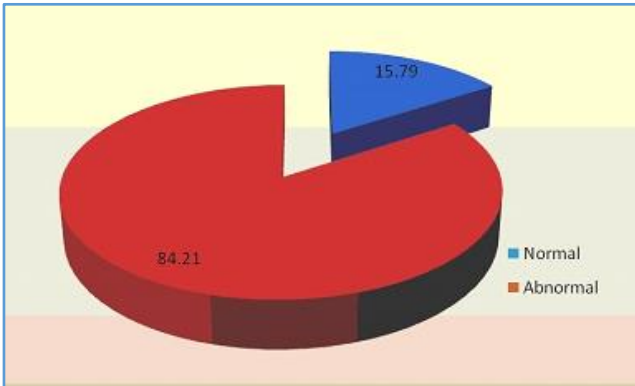


Figure 10. Distribution of Patients of Cardioembolic Stroke According to ECG at Presentation

2D ECHO Findings	No. of Patients (n=19)	Percentage
Patent Foramen Ovale	02	10.53
Atrial Septal Defect	01	5.26
Isolated valvular abnormality	02	10.53
Valvular Abnormality with Atrial Fibrillation	03	15.79
Non-Valvular Atrial Fibrillation	06	31.58
Regional Wall Motion Abnormalities	03	15.79
Dilated Cardiomyopathy	02	10.53
Total	19	100

Table 11. Distribution of Patients of Cardioembolic Stroke According to 2D Echocardiography Findings Potential Cardiac Source of Embolism

Size	No. of Patients	Percentage
Large	11	57.90
Medium	07	36.85
Small	01	05.26
Total	19	100

Table 12. Distribution of Patients of Cardioembolic Stroke According Infarct Size on CT/MRI

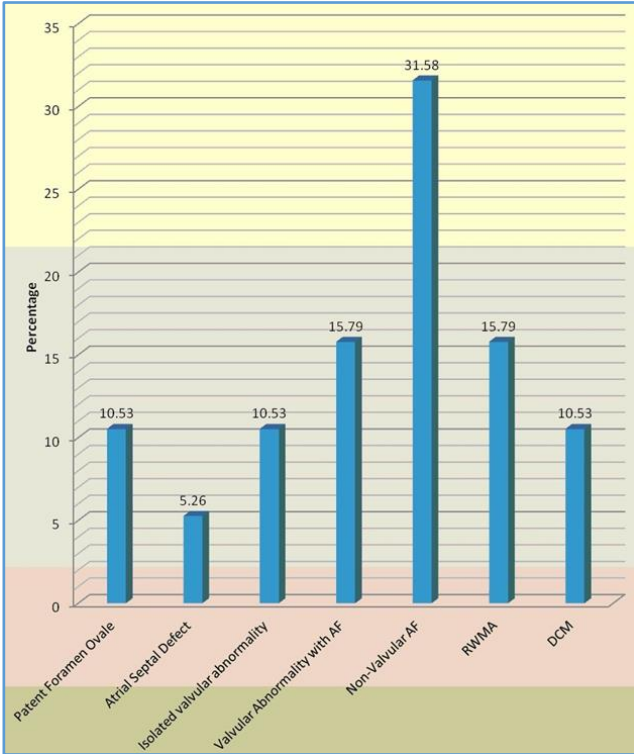


Figure 11. 2D Echocardiography Findings Suggesting Potential Cardiac Source of Embolism

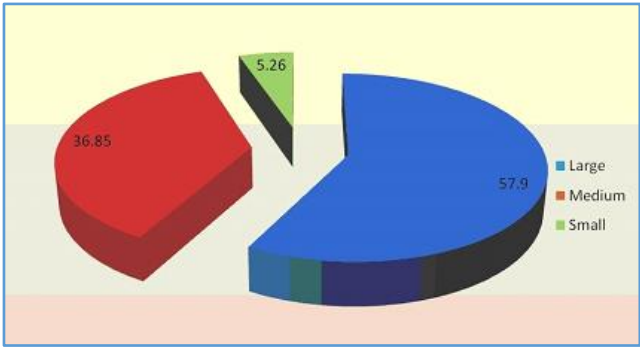


Figure 12. Infarct Size on CT /MRI

Topography of Infarct	No. of Patients (n=19)	Percentage
ACA	01	5.26
MCA	10	52.63
PCA	03	15.79
Watershed	01	05.26
Haemorrhagic transformation	01	05.26
Multiple territory infarct	03	15.79

Table 13. Distribution of Patients of Cardioembolic Stroke According to Topography of Infarction

The present observational study was conducted to know the incidence, aetiology, clinical presentation and outcome of a cardioembolic stroke.

The present study was conducted upon 100 cases admitted in Intensive Care Unit in Al Ameen Medical College Hospital with an onset of acute neurological deficit with age group between 30 to 85 years having first event of acute ischemic stroke satisfying the inclusion and exclusion requirements. The duration of study period was from November 2015 to August 2017.

Outcome	No. of Patients	Percentage
Survived	17	89.47
Died	02	10.53
Total	19	100

Table 14. Distribution of Patients of Cardioembolic Stroke According to Outcome

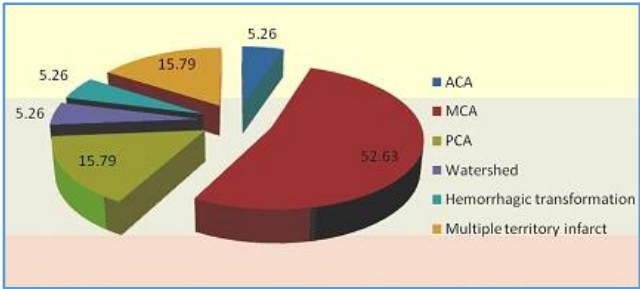


Figure 13. Topography of Infarction in Cardioembolic Stroke

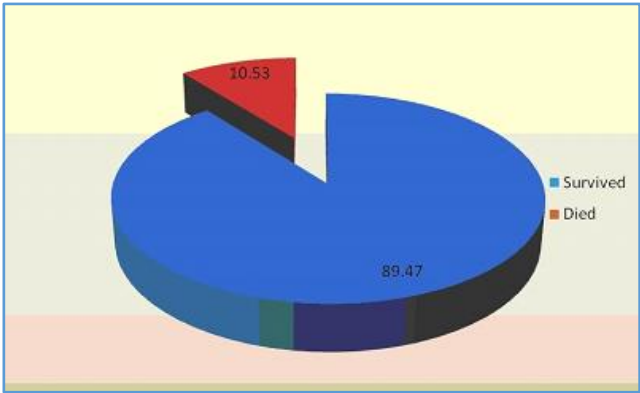


Figure 14. Outcome in Patients of Cardioembolic Stroke

Patients previously diagnosed with history of stroke, transient ischemic attacks, cerebral haemorrhage, haematological disorders, autoimmune diseases, cancer, infectious diseases i.e. tuberculosis, HIV and those on oral contraceptive pills were excluded from study.

A written informed consent was obtained from the participant patient or his/her relatives. The study was approved by the ethical committee of the institute. All the patients were subjected to routine blood investigations, 2D Echocardiography and MRI/CT scan brain.

Demographic Characteristics

In the present study, it was observed in general that majority of patients were in age group 61-85 years (42%) followed by 51-60 years (26%). The mean age of the patients was 55.95±12.71 years. The majority of patients were male 62% and females were 38%.

Similar results were observed in a study done by Siddharth Raghuvanshi¹⁴ on clinical profile and subtypes of acute Ischemic stroke in a tertiary care center where mean age among patients was 53.02 ± 14.38 years with 74.28% males and 25.71% females.

Deepa Dash et al¹⁵ in another study on risk factors and aetiologies of ischemic strokes observed that male to female ratio was 5:1, and the mean patient age was 38.9±7.1 years.

Incidence

In present study, it was observed that incidence of cardioembolic stroke among the ischemic stroke patients was 19%. The incidence of atherothrombotic stroke was 39%, lacunar stroke was 24% and unknown cause was 19%.

In a study done by Konstantin’s Spengoset al¹⁶ to determine the source of embolism and evaluate outcomes in ischemic stroke of cardioembolic aetiology observed that cardio embolism was diagnosed in 45 cases (18.4%) which are similar to our findings.

In the study done by Siddharth Raghuvanshi,¹⁴ 16% of patients were with cardioembolic stroke in concordance with our study.

Age and Sex

It was observed in the present study that majority of the patients having cardioembolic stroke belong to the age group of 60-85 years (47.37%) followed by age group of 51-60 years (31.58%). The incidence in age group of 30-40 years was 10.52%. The mean age in our study was 59.21 ± 12.10 years, the incidence of Cardioembolic stroke among male patients was 63.16% and female was 36.84%. Luiz Carlos Porcello Marrone et al¹⁷ in a study on cardioembolic sources in stroke patients observed that among 256 patients mean age was 60.2 ± 6.9 years with 132 males, similar to our findings. Also, in the study done by Konstantinos Spengos et al,¹⁶ males (62.2%) outnumbered females. Masahiro Yasaka et al¹⁸ who studied clinical features in acute Cardioembolic stroke observed that mean age was 68.6 ± 13.2 years and that out of 227 consecutive patients, 128 were men and 99 were women.

Aetiology

In the present study, the most common cause of cardioembolic stroke among patients was Atrial Fibrillation (47.37%). The other aetiologies were Valvular heart disease (21.05%), Coronary Artery Disease (21.05%), Congenital Abnormalities (15.78%), Dilated Cardiomyopathy (10.53%), Non-bacterial Endocarditis (5.25%).

This is similar to the study by Luiz Carlos Porcello Marrone et al¹⁷ on cardioembolic sources in stroke patients where arrhythmias were the most common cause of cardioembolism corresponding to 50.7%, followed by valvular heart disease (17.5%) and coronary artery disease (16%). Contrast to this, in another study done by Konstantin's Sponges et al¹⁹ to determine the source of embolism in ischemic stroke of cardioembolic aetiology observed half of the cases (48.9%) were attributed to congenital anomalies.

Some cardiac sources of stroke have a considerably higher risk of initial and recurrent embolism than other cardiac causes. Accordingly, the Stroke Data Bank 122 divided the potential cardiac causes of stroke into strong sources (prosthetic valves, atrial fibrillation, sick-sinus syndrome, ventricular aneurysm, kinetic segments, mural thrombi, cardiomyopathy and diffuse ventricular hypokinesia) and weak sources (myocardial infarct in earlier months, aortic and mitral stenosis, aortic and mitral regurgitation, congestive heart failure, mitral valve prolapse, mitral annulus calcification and hypokinetic ventricular segments).

Clinical Presentation

It was observed that majority of patients were having hypertension (52.63%) and 26.32% had Diabetes Mellitus (26.32%), 15.79% of the patients had previous history of MI. 9 (47.37%) patients were smokers and dyslipidaemia was observed in 4 (21.05%) patients and 2 (10.53%) patients were alcoholic. Luiz Carlos Porcello Marrone et al¹⁷ in a study on cardioembolic sources in stroke patients observed that hypertension (61.7%) and dyslipidaemia (43.7%) were the most common risk factors. In the study

done by Konstantinos Spengos et al¹⁶ most commonly documented risk factors in this group of cardioembolic stroke patients were active smoking (46.7%), dyslipidaemia (20%) and myocardial infarction (11.1%). Hypertension was present in only 2.2% and diabetes in 6.7% of all patient.

It was observed in our study that mean fasting blood sugar among patients was 110.3 ± 28.62 mg/dl, mean systolic blood pressure among patients was 158.1 ± 15.19 mm of Hg and mean diastolic blood pressure among patients was 86.52 ± 7.24 mm of Hg.

In the present study, the majority of patients presented with motor impairment (68.42%) followed by altered consciousness (47.37%). The other clinical presentation includes speech disturbance (42.11%), headache (38.84%) and vomiting (31.57%).

In the study of Timsit et al.,²⁰ altered consciousness was a predictive factor of cardioembolic cerebral infarction, with an odds ratio (OR) of 3.2 as compared with atherothrombotic infarction, sudden onset of neurological deficit occurs in 79.7% of cases of cardioembolic cerebral infarction. This discrepancy can be attributed to the smaller study population size in our study.

A classic cardioembolic stroke presents with onset of symptoms after a Valsalva-provoking activity (Coughing, bending, etc.) Suggesting paradoxical embolism facilitated by a transient rise in right atrial Pressure and the co-occurrence of cerebral and systemic emboli.⁵

On the other hand, other clinical symptoms classically associated with cardioembolic cerebral infarction, such as headache, seizures at onset and onsets during activity are not specific for cardioembolic stroke. It was found that sudden onset of neurological deficit and heart rhythm disturbance were independent predictive variables of cardioembolism.²¹ It was observed in the present study that majority of patients had abnormal ECG findings (84.21%). In the present study, the most common 2D Echo finding was Non-Valvular AF (31.58%) followed by AF with underlying valvular abnormality (21.05%) and Regional Wall Motion Abnormalities (21.05%). 2 patients (10.53%) had Dilated Cardiomyopathy and another 2 patients (10.53%) had isolated valvular abnormality. Of 3 patients who had paradoxical embolism, PFO was detected in 2 patients (10.53%) and ASD in 1 patient (5.26%).

Similar findings were obtained in studies from USA,²² where non-valvular AF as the commonest source of brain embolism accounting for upto 45%. In contrast another study done in India at New Delhi²³ showed only 10% with non-valvular AF. Cujecet al²⁴ and Lobovitz et al²⁵ found regional wall motion abnormalities the most common echocardiographic findings as the source for cardio embolism.²¹

In the study done by Konstantinos Spengos et al,¹⁹ there were 13 cases of patent foramen ovale (28.9%), 7 cases of atrial septum aneurysm (15.6%), and 1 case with both defects (2.2%).

Karenberg et al.²⁶ evaluated 441 unselected stroke patients detecting a cardiac source of embolism in 56% of the patients. The diagnosis of thrombus was mainly atrial

abnormality, infectious endocarditis and cardiac tumours along with conditions such as PFO, atrial septal aneurysm etc. The pathological role of these abnormalities remains controversial as two or more above mentioned Conditions co-exist, the significance of this association is unknown.

The diagnosis of Cardioembolic Infarction was mainly a "presumed" diagnosis based on clinical features and electrocardiography findings. However, clinical diagnosis of cardioembolic infarction has recently shown a substantial advance in relation to the use of echocardiography in routine clinical practice, 24 hour Holter monitoring and diffusion magnetic resonance imaging, allowing a non-invasive diagnosis of potentially emboligenous structural heart diseases, detection of clinically silent paroxysmal heart rhythm disorders or acute multiple simultaneous cerebral infarctions, which are characteristics of the embolic phenomena.²⁷⁻²⁹

In present study it was observed that majority of patients had MCA territory (52.63%) infarct followed by PCA territory (15.79%), which is similar to Lausanne stroke registry,³⁰ where MCA was the most common territory involved in cardioembolic strokes.

It was observed in the present study that majority of patients had large size infarct (57.9%) followed by medium size (36.84%) and small infarct size among 5.26% patients.

Outcome

It was observed in our study that majority of patients survived (89.47%) while 02 (10.53%) patients died during hospital stay. Our findings are similar to the study done by Konstantin's Spengoset al,¹⁶ where out of 45 patients with cardioembolic stroke only one patient died. Similar experience and in agreement with our study, the clinical series of Caplanet al.³¹ the in-hospital mortality rate of cardioembolic cerebral infarction was 27.3%.

The limitation of present study was that it was not a population-based study and the relatively small sample size, it limits the extent to which we may draw conclusions from our findings. Also, technical difficulty such as difficulty to visualize the thrombi on echocardiography due to complete embolization of intracardiac clot is to be considered.

CONCLUSION

In the present study, the incidence of cardioembolic stroke among patients was 19% with male predominance. Non-valvular AF was found in majority of patients. The patients mostly presented with motor impairment followed by altered consciousness and speech disturbance with involvement of the MCA territory. The survival rate was 89.47%. This study also emphasizes the importance of the evaluation of cardiovascular system in a stroke patient. Any correctable causes of cardioembolic stroke may be addressed to avoid such events in future.

Further studies are needed in order to verify our observations and evaluate cardioembolic stroke in more detail in a larger population.

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